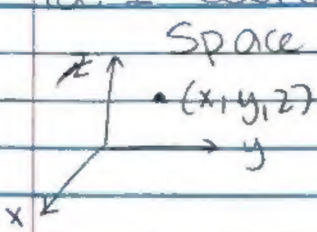
12.1 coordinate systems in 3D Space



3-Space = $\mathbb{R}^3$

Notation: $\{(x,y,z) \in \mathbb{R}^3\}$

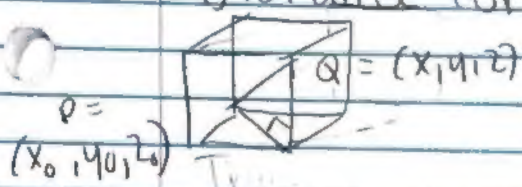
I - Coordinate Planes

- a coordinate plane in $\mathbb{R}^3$ is a set of planes all which have a coordinate of zero

ie: $(x,y,0)$, $(x,0,z)$, $(0,y,z)$

A- Distances in 3-Space

Distance formula: $\sqrt{(x-x_0)^2+(y-y_0)^2+(z-z_0)^2}$



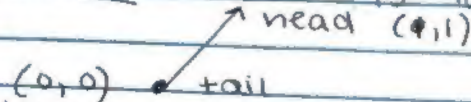
II - Spheres

Let $P=(x_0,y_0,z_0)$ in $\mathbb{R}^3$ and $r>0$.
The sphere centered at P and radius r is $S=\{(x,y,z) \in \mathbb{R}^3 : d(P,Q)=r\}$

↳ $r^2=(x_0-x)^2+(y_0-y)^2+(z_0-z)^2$

12.2 Vectors

Vector in $\mathbb{R}^3$ is a directed line segment



} example shown in $\mathbb{R}^2$

↳ vectors are equiv. when they are linear shifts of each other

ex: $(0,0)\to(1,0) == (2,0)\to(3,0)$